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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>18 July 2005</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>30-48</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>30-48</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>03 December 2003</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☒ All   b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

DETAILED ACTION

1.   The examiner acknowledges the preliminary amendment dated 18 July 2005,

canceling original claims 1-29 and amending claims 30-48, which were introduced in a

preliminary amendment dated 25 March 2005. Therefore, the instant application having

Application No. 10/748,886 has a total of 19 claims pending in the application; there are

2 independent claims and 17 dependent claims, all of which are ready for examination

by the examiner.

Oath/Declaration

2.   The applicant's oath/declaration has been reviewed by the examiner and is found

to conform to the requirements prescribed in 37 C.F.R. 1.63.

Priority

3.   Acknowledgment is made of applicant's claim for foreign priority under 35

U.S.C. 119(a)-(d). The certified copy has been filed in the instant Application.

Drawings

4.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they include the following reference character(s) not mentioned in the

description: **1101-1104 (Figs, 11-14) and 1205 (Fig. 12)**. Corrected drawing sheets in

compliance with 37 CFR 1.121(d), or amendment to the specification to add the

reference character(s) in the description in compliance with 37 CFR 1.121(b) are

required in reply to the Office action to avoid abandonment of the application. Any

amended replacement drawing sheet should include all of the figures appearing on the

immediate prior version of the sheet, even if only one figure is being amended. Each

drawing sheet submitted after the filing date of an application must be labeled in the top

margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If

the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the

drawings will not be held in abeyance.

5.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4)

because **reference characters "1101" and "1102" have been used to designate**

both "primary volume" and "auxiliary volume". Furthermore, reference

characters "1103" and "1104" have been used to designate both "primary

journal" and "auxiliary journal". Specifically, in Fig. 18, it is believed that the

applicant intended for "1102" and "1104" to refer to the "auxiliary volume" and

"auxiliary journal", respectively, and for "1101" and "1103" to refer to the

"primary volume" and "primary journal", respectively. Corrected drawing sheets in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. Any amended replacement drawing sheet should

include all of the figures appearing on the immediate prior version of the sheet, even if

only one figure is being amended. Each drawing sheet submitted after the filing date of

an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

Information Disclosure Statement

6.   As required by M.P.E.P. 609(c), the applicant's submission of the Information

Disclosure Statements dated 13 September 2004, 14 January 2005, 28 June 2005, 18

July 2005, 6 October 2005 and 26 October 2005 are acknowledged by the examiner

and the cited references have been considered in the examination of the claims now

pending. As required by M.P.E.P. 609(c)(2), a copy of the PTOL-1449s initialed and

dated by the examiner are attached to the instant office action.

Specification

7.   The disclosure is objected to because of the following informalities: Page 8, Line

9 states "the second and 20", where it is believed that the applicant intended to state

"the second 20". Appropriate correction is required.

8.   The lengthy specification has not been checked to the extent necessary to

determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the

specification.

9.   Applicant is reminded of the proper language and format for an abstract of the
disclosure.

The abstract should be in narrative form and generally limited to a single
paragraph on a separate sheet **within the range of 50 to 150 words. It is important
that the abstract not exceed 150 words in length since the space provided for the**

abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 112

10.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11.   Claims 45-47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12.   Claims 45-47 recite the limitation "said first command". There is insufficient antecedent basis for this limitation in the claim. It is noted that claim 30 provides "a command", however it does not provide a first command.

Claim Rejections - 35 USC § 102

13.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14.   Claims 30-48 are rejected under 35 U.S.C. 102(e) as being anticipated by

LeCrone (U.S. Pat. 6,529,944), hereinafter referred to as LeCrone or L1. LeCrone

incorporates by reference LeCrone et al. (U.S. Pat. 6,631,477), hereinafter referred to

as LeCrone2 or L2.

Claim 30

LeCrone discloses a storage system comprising:

a first storage device **(L1 - Fig. 1, Symm2)**, coupled to an information processing

device **(L1 - Col. 7, Lines 51-53; Fig. 1, Item 02)** having a first controller **(L1 - Fig. 7a,**

Items DA1-DA3; Col. 1, Lines 33-35) and a plurality of first disk drives **(L1 - Fig. 7a,**

Items C1-C3; Col. 1, Lines 33-39);

said first controller controlling to store data received from said information

processing device in said disk drives and receiving a command from said information

processing device and transferring said command to a second storage device, said

command sent from said information processing device to said second storage device

(L1 - Col. 8, Lines 40-51) being used to request a pair management information of a

first logical volume in said second storage device **(L1 - Col. 9, Line 66 – Col. 10, Line**

5);

said second storage device, coupled to said first storage device **(L1 - Col. 8,**

Lines 5-9) having a second controller **(L1 - Fig. 7a, Items DA1-DA3; Col. 1, Lines 33-**

35) and a plurality of second disk drives **(L1 - Fig. 7a, Items C1-C3; Col. 1, Lines 33-**

39), said second disk drives corresponding to a plurality of logical volumes which have

said first logical volume **(L1 - Col. 1, Lines 37-39)**; and

said second controller controlling to store data in said second disk drives, and

receiving said command from said first storage device and sending said pair

management information of said first logical volume to said information processing

device via said first storage device in response to said command **(L1 - Col. 9, Line 66 –**

Col. 10, Line 5; Since commands can only be sent through the chain, the

response must be returned via the first storage device).

Claim 31

LeCrone further discloses wherein said pair management information of said first

logical volume is information of a relationship between said first logical volume and a

second logical volume in said second storage device **(L2 - Col. 12, Lines 58-59; L2**

discloses a query command that checks if a volume is paired with another

volume and if so the status of the data in the pair, wherein both volumes are in a

single storage device).

Claim 32

LeCrone further discloses wherein said pair management information of said first

logical volume is whether said first logical volume is under copying data from said first

logical volume to a second logical volume in said second storage device or not **(L2 –**

Col. 13, Lines 7-13; In the reference, L2 discloses two conditions such that a BCV

pair is established/restored and synchronized or a BCV pair is

established/restored and being synchronized. It is noted that the examiner is

interpreting copying as the process that takes place when a pair is established

for the first time and all data is copied from one volume to the other volume as is

disclosed in the instant specification on pg. 20, line 24 – pg. 21, line 2. Therefore,

when the BCV pair is established and being synchronized it is under copying.).

Claim 33

LeCrone further discloses wherein said pair management information of said first

logical volume is whether said first logical volume is under restoring data from said first

logical volume to a second logical volume in said second storage device or not (L2 –

Col. 13, Lines 7-13; In the reference, L2 discloses two conditions such that a BCV

pair is established/restored and synchronized or a BCV pair is

established/restored and being synchronized. It is noted that the examiner is

interpreting restoring as the process that takes place when a pair is

resynchronized due to changes in the primary volume as is disclosed in the

instant specification on pg. 22, line 20 – pg. 3, line 11. Therefore, when the BCV

pair is restored and being synchronized it is under restoring.).

Claim 34

LeCrone further discloses wherein said pair management information of said first

logical volume is information of a relationship between said first logical volume and a

third logical volume in said first storage device (L2 - Col. 12, Lines 58-59; L2 discloses

a query command that checks if a volume is paired with another volume and if so

the status of the data in the pair, wherein both volumes are in a single storage

device, however L1 discloses wherein the commands of L2 are modified such

that they can be at any storage device in the chain of devices (Col. 8, Lines 30-

51)).

Claim 35

LeCrone further discloses wherein said pair management information of said first

logical volume is whether said first logical volume is under copying data from a third

logical volume in said first storage device to said first logical volume or not **(L2 – Col.**

13, Lines 7-13; In the reference, L2 discloses two conditions such that a BCV pair

is established/restored and synchronized or a BCV pair is established/restored

and being synchronized. It is noted that the examiner is interpreting copying as

the process that takes place when a pair is established for the first time and all

data is copied from one volume to the other volume as is disclosed in the instant

specification on pg. 20, line 24 – pg. 21, line 2. Therefore, when the BCV pair is

established and being synchronized it is under copying. Furthermore, as is

discussed above in reference to claim 34, although L2 discloses the query being

for only one storage device, L1 discloses that the command can be issued

anywhere in the chain of devices.).

Claim 36

LeCrone further discloses wherein said pair management information of said first

logical volume is whether said first logical volume is under copying data from said first

logical volume to a third logical volume in said first storage device or not **(L2 – Col. 13,**

Lines 7-13; In the reference, L2 discloses two conditions such that a BCV pair is

established/restored and synchronized or a BCV pair is established/restored and

being synchronized. It is noted that the examiner is interpreting copying as the process that takes place when a pair is established for the first time and all data is copied from one volume to the other volume as is disclosed in the instant specification on pg. 20, line 24 – pg. 21, line 2. Therefore, when the BCV pair is established and being synchronized it is under copying. Furthermore, as is discussed above in reference to claim 34, although L2 discloses the query being for only one storage device, L1 discloses that the command can be issued anywhere in the chain of devices.).

Claim 37

LeCrone further discloses wherein said pair management information of said first logical volume has information of a plurality of regions in said first logical volume (L1 - Col. 6, Lines 54-67).

Claim 38

LeCrone further discloses wherein said pair management information of said first logical volume has information of regions storing data which will be copied from said first logical volume to a second logical volume in said second storage device (L1 - Col. 6, Lines 54-67; Col. 7, Lines 10-14; In the reference, L1 discloses where a BCV pair is established such that data is copied from a source volume to the BCV volume. As data is copied from the source to the BCV new data is being written to the source as well, therefore the volumes must keep track of what data is to be copied to the BCV.).

Claim 39

LeCrone further discloses wherein said pair management information of said first

logical volume has information of regions storing data which will be restored from said

first logical volume to a second logical volume in said second storage device **(L1 - Col.**

7, Lines 10-14 and 28-36; In the reference, L1 discloses where a BCV pair has

been synchronized with a source volume. After the synchronization new data is

being written to the source and the pair may also be suspended and resumed at a

later time. Therefore the volumes must keep track of what data is to be restored

to the BCV volume as new data is written after synchronization or after the pair is

resumed.).

Claim 40

LeCrone further discloses wherein said pair management information of

said first logical volume has information of regions storing data which will be copied

from a third logical volume in said first storage device to said first logical volume **(L1 -**

Col. 6, Lines 54-67; Col. 7, Lines 10-14; In the reference, L1 discloses where a

BCV pair is established such that data is copied from a source volume to the BCV

volume. As data is copied from the source to the BCV new data is being written

to the source as well, therefore the volumes must keep track of what data is to be

copied to the BCV. Furthermore, the pairs can be established between any of the

volumes in any of the storage devices.).

Claim 41

LeCrone further discloses wherein said pair management information of said first

logical volume has information of regions storing data which will be copied from said

first logical volume to a third logical volume in said first storage device **(L1 - Col. 6,**

Lines 54-67; Col. 7, Lines 10-14; In the reference, L1 discloses where a BCV pair

is established such that data is copied from a source volume to the BCV volume.

As data is copied from the source to the BCV new data is being written to the

source as well, therefore the volumes must keep track of what data is to be

copied to the BCV. Furthermore, the pairs can be established between any of the

volumes in any of the storage devices.).

Claim 42

LeCrone further discloses wherein said first controller transfers said command to

said second storage device based on contents of said command **(L1 - Fig. 15; Col. 12,**

Lines 45-67).

Claim 43

LeCrone further discloses wherein said first controller provides a fourth logical

volume to said information processing device, said fourth logical volume is used to

control said first storage device by said information processing device; and

said first controller transfers said command to said second storage device based

on contents of said command sent from said information processing device to said

fourth logical volume **(L1 - Fig. 15; Col.12, Lines 45-67; Note that although L1 does**

not disclose expressly that a third logical volume is used to control the first

storage device it is inherently implied. In Col. 8, Lines 40-51, it is stated that commands can be executed by any of the storage systems in the chain of devices. For a controller on the first storage device, for instance, to execute a command from the information processing device, the command must be stored on a volume of the first storage device since a command cannot be executed without being stored in a memory. Therefore, the command is stored on a logical volume that is used to control the storage device).

Claim 44

LeCrone further discloses wherein said first controller provides a fifth logical volume to said information processing device, said fifth logical volume corresponding to a sixth logical volume in said second storage device; and

said first controller transfers said first command to said sixth logical volume if said fifth logical volume is addressed in said command sent from said information processing device (L1 - Col. 12, Lines 52-60; In the referred to embodiment, if the host is attempting to access a logical volume on a remote storage device, it can send a command addressed to a source volume. The first storage device will then interpret the request as actually addressing the remote volume that this source volume refers to. Therefore, the referred embodiment describes where a command sent to a "fifth" logical volume is transferred to a "sixth" logical volume).

Claim 45

LeCrone further discloses wherein said first command has information which is used to identify said first logical volume from said logical volumes **(L1 - Fig. 4; In the shown commands, the ragrp or cuu parameter is used to identify the logical volumes (Col. 8, Line 52 – Col. 9, Line 5))**.

Claim 46

LeCrone further discloses wherein each of said logical volumes has a logical unit number which is used to identify a logical volume from said logical volumes; and

said first command has information of a plurality of logical unit numbers **(L1 - Fig. 4; In the shown commands, the ragrp or cuu parameter is used to identify the logical volumes (L1 - Col. 8, Line 52 – Col. 9, Line 5))**.

Claim 47

LeCrone further discloses wherein said first controller executes contents of said first command if said first command does not have information of said second storage device to which data is to be transferred **(L1 - Col. 12, Lines 45-48)**.

Claim 48

LeCrone discloses a storage system comprising:

a first storage device **(L1 - Fig. 1, Symm2)**, coupled to an information processing device **(L1 - Col. 7, Lines 51-53; Fig. 1, Item 02)** having a plurality of first disk drives **(L1 - Fig. 7a, Items C1-C3; Col. 1, Lines 33-39)**;

a first controller **(L1 - Fig. 7a, Items DA1-DA3; Col. 1, Lines 33-35)** controlling to store data received from said information processing device in said disk drives and

receiving a command which is being sent from said information processing device to a

second storage device, said command being used to request a pair status of a first

logical volume **(L1 - Col. 9, Line 66 – Col. 10, Line 5)** and transferring said command

to said second storage device **(L1 - Col. 8, Lines 40-51)**;

said second storage device, coupled to said first storage device **(L1 - Col. 8,**

Lines 5-9) having a plurality of second disk drives **(L1 - Fig. 7a, Items C1-C3; Col. 1,**

Lines 33-39), said second disk drives corresponding to a plurality of logical volumes

which have said first logical volume **(L1 - Col. 1, Lines 37-39)**; and

a second controller **(L1 - Fig. 7a, Items DA1-DA3; Col. 1, Lines 33-35)**

controlling to store data in said second disk drives, receiving said command from said

first storage device and sending said pair status of said first logical volume in response

to said command **(L1 - Col. 9, Line 66 – Col. 10, Line 5; Since commands can only**

be sent through the chain, the response must be returned via the first storage

device).

Conclusion

15.   The following is a summary of the treatment and status of all claims in the

application as recommended by M.P.E.P. 707.07(i):

a.   Claims 1-29 were cancelled by the preliminary amendment dated 18 July

2005.

b.   Per the instant office action, claims 30-48 have received a first action on

the merits and are subject of a first action non-final.

16.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Ankur Gogia whose telephone number is 571-272-4166.

The examiner can normally be reached on M-F 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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published applications may be obtained from either Private PAIR or Public PAIR.

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Ankur Gogia
Examiner
Art Unit 2187

12/20/05

CHRISTIAN CHACE
PRIMARY EXAMINER